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ARTICLE

PREVALENCE OF VISUAL IMPAIRMENT AMON\G SCHOOLCHILDREN IN LENGKONG SUBDISTRICT BANDUNG

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ABSTRACT

Visual impairment in children still becomes a burden globally. It can affect children's learning process, career options, and psychosocial development eventually. This study aims to determine the prevalence of visual impairment among schoolchildren in Lengkong Subdistrict, Bandung. This was a retrospective descriptive study using secondary data from visual impairment screening program of schoolchildren aged 6-14 years, which was conducted by Health Promotion Unit of Bandung Eye Center Hospital from August to November 2023. The sample for this study was collected using a total sampling technique. A total of 907 data consisting The Relationship Of Online Game Addiction To Changes In Emotional Regulation Of Medical Faculty Students At Maranatha Christian University of Uncorrected Visual Acuity (UCVA), Presenting Visual Acuity (PVA), age, and gender were collected and analysed using Microsoft Excel 2019. The prevalence of visual impairment in schoolchildren was 16.2% with UCVA and 11.1% with PVA, moderate visual impairment was the major classification. Female students were more likely to have visual impairment compared to male students. The highest number of visual impairments with UCVA and PVA compared to age distribution was 12 years old. These results need to become school and government's concern to create further policy regarding children's eye health to support an optimal learning process.

Keywords: Prevalence; Schoolchildren; Visual impairment

АБСТРАКТ

Нарушения зрения у детей по-прежнему остаются серьезной проблемой во всем мире. Они могут повлиять на процесс обучения детей, их карьерные возможности и, в конечном итоге, на их психосоциальное развитие. Цель данного исследования — определить распространенность нарушений зрения среди школьников в районе Ленконг, Бандунг. Это было ретроспективное описательное исследование с использованием вторичных данных программы скрининга нарушений зрения у школьников в возрасте от 6 до 14 лет, проведенной отделом по продвижению здоровья больницы Bandung Eye Center Hospital с августа по ноябрь 2023 года. Выборка для этого исследования была собрана с использованием метода полной выборки. Было собрано и проанализировано с помощью Microsoft Excel 2019 в общей сложности 907 данных, включая некорректированную остроту зрения (UCVA), текущую остроту зрения (PVA), возраст и пол. Распространенность нарушений зрения у школьников составила 16,2% по UCVA и 11,1% по PVA, причем основной классификацией были умеренные нарушения зрения. Девочки чаще страдали нарушениями зрения, чем мальчики. Наибольшее количество нарушений зрения по UCVA и PVA по сравнению с возрастным распределением было отмечено в возрасте 12 лет. Эти результаты должны стать предметом внимания школ и правительства для разработки дальнейшей политики в области здоровья глаз детей с целью поддержки оптимального процесса обучения.

Ключевые слова: распространенность; школьники; нарушения зрения

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INTRODUCTION

Blindness and visual impairment continue to be a burden for global health. According to the WHO, globally, around 2.2 billion people suffered from visual impairment, of which one million are avoidable visual impairments.[1,2,3] In Indonesia, blindness and visual impairment remain unresolved burdens. Nevertheless, according to data from the Rapid Assessment of Avoidable Blindness (RAAB) in 2016, cataract is the leading cause of blindness (70–80%) in visual impairment problems, followed by refractive error (10–15%) and posterior segment disease (1.9–10.9%).[4]

Visual impairment in children is a concern for public health globally since visual impairment in children will have a significant effect on the learning process, career options, and psychosocial aspect. Visual capability handles 85% of the learning process. In order to maximize that process, examination of visual acuity regularly is important to encourage a child's growth and development.[1] There are many studies that declared visual impairment in children requires special concern. Globally, an estimated 239 million children experience visual impairment, according to that, an estimated 1.4 million cases are caused by retinal and corneal disease, and about the other 2 million are untreated refractive errors.[5] A study conducted in Bhutan revealed that the prevalence of visual impairments in children was 14.5% for Uncorrected Visual Acuity (UCVA) and 12.8% for Presenting Visual Acuity (PVA).[6] Another study in South India and Ethiopia showed visual impairment prevalence was 1.16% and 7%, respectively.[7,8] In Indonesia, studies on the prevalence of visual impairment among schoolchildren remain limited. A study from the Cicendo National Eye Hospital in 2015, using secondary data from medical records in the Pediatric Ophthalmology Department, revealed there are 1,684 children aged 3 to 15 with visual impairment.[9]

This study aims to determine the prevalence of visual impairment in school children in Lengkong Subdistrict, Bandung. This study's results are expected to serve as a reference for representing the condition of visual impairment among children in Indonesia, especially in Bandung, and as a reference for making further policies related to children's eye health.

MATERIAL AND METHODS

This study was a retrospective descriptive study using secondary data collected from visual impairment screening program conducted by Health Promotion Unit of Bandung Eye Center Hospital. The screening took place in six schools in the Lengkong Subdistrict of Bandung from August to November 2023. The sample for this study was selected using a total sampling technique. The inclusion criteria were visual examination data from children aged 6–14 who participated in the visual impairment screening program using Peek Acuity, conducted by Health Promotion Unit Bandung Eye Center Hospital.[10,11,12] The exclusion criteria involved incomplete examination data for Uncorrected Visual Acuity (UCVA), Presenting Visual Acuity (PVA), age, and gender.

UCVA refers to unaided distance correction visual acuity, while PVA is the visual acuity achieved with the participants' distance correction, such as spectacles.[13] Both UCVA and PVA were recorded from the worse eye. The data was analyzed using Microsoft Excel 2019 and classified according to the World Health Organization (WHO) distance visual impairment classification: mild visual impairment (worse than 6/12), moderate visual impairment (worse than 6/18), severe visual impairment (worse than 6/60), and blindness (worse than 3/60).[3,13] This study has met the ethics requirements from Cicendo National Eye Hospital under protocol number DP.04.03/D.XXIV.16/1615/2025.

RESULT

A total visual examination data of 907 children aged 6-14 years was obtained in this study, consisting of 460 (50.7%) males and 447 (49.3%) females. Age groups were classified based on Statistics Indonesia.[12]

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Table 1. Demographic Characteristics and Visual Impairment Classification

Characteristic	(n = 907)	(%)
Gender		
Male	460	50.7
Female	447	49.3
Age (years)		
6	30	3.3
7-12	710	78.3
13-14	167	18.4
UCVA		
No VI	760	83.8
VI	147	16.2
Mild	49	33.3
Moderate	86	58.5
Severe	8	5.5
Blindness	4	2.7
PVA		
No VI	806	88.9
VI	101	11.1
Mild	47	46.5
Moderate	51	50.5
Severe	3	3.0
Blindness	0	0.0

UCVA: *Uncorrected Visual Acuity*; PVA: *Presenting Visual Acuity*; VI: *Visual Impairment*

The mean age of the participants was 10.3 years old, within the age range of 6-14 years old. This study showed that the students who had visual impairment was 143 (16.2%) with UCVA and 101 (11.1%) with PVA.

In Table 2, the prevalence of visual impairment with UCVA was found to be 16.2%. Out of the total students examined, 49 (5.4%) were identified with mild visual impairment, 86 (9.5%) had moderate visual impairment, 8 (0.9%) experienced severe visual impairment, and 4 (0.4%) were classified as having blindness.

Table 2. Visual Impairment Based on Age in Total Population

Age (years)	6	7-12	13-14	Total (%)
UCVA				
Normal	24	605	131	760 (83.8)
Mild	1	40	8	49 (5.4)
Moderate	4	56	26	86 (9.5)
Severe	1	6	1	8 (0.9)
Blindness	0	3	1	4 (0.4)
Total	6 (0.7)	105 (11.6)	36 (4.0)	
PVA				
Normal	25	636	145	806 (88.9)
Mild	0	35	12	47 (5.2)
Moderate	4	37	10	51 (5.6)
Severe	1	2	0	3 (0.3)
Blindness	0	0	0	0 (0)
Total	5 (0.6)	74 (8.2)	22 (2.4)	

*n=907; UCVA: *Uncorrected Visual Acuity*; PVA: *Presenting Visual Acuity*

On the other hand, the prevalence of visual impairment with PVA was 11.1%. Specifically, 47 (5.2%) students were found to have mild visual impairment, 51 (5.6%) students had moderate visual impairments, 3 (0.3%) students had severe visual impairments and there were no cases of blindness. The major classification of visual impairment in this study, both UCVA and PVA, was moderate visual impairment (worse than 6/18). Moreover, the highest number of visual impairments based on age in total population was 7-12 years old. A total case decrease of 5.1% in the prevalence of visual impairments was obtained when comparing UCVA to PVA with complete reduction in blindness. These findings indicate that PVA significantly reduces the overall prevalence of visual impairments compared to UCVA.

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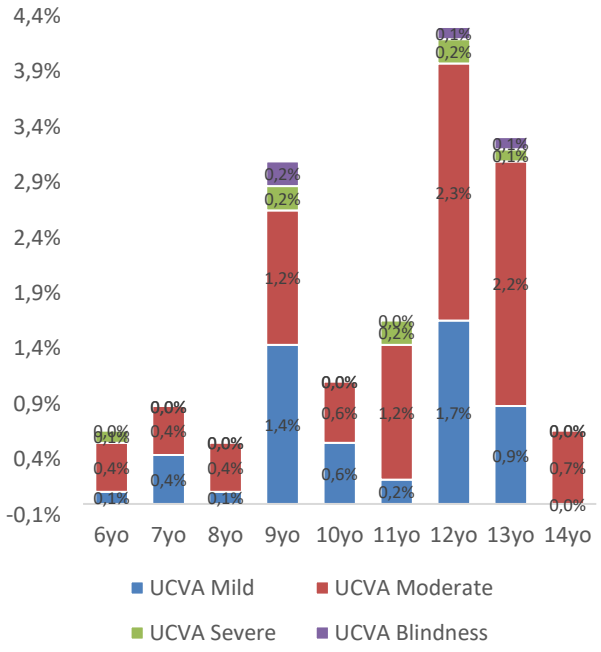
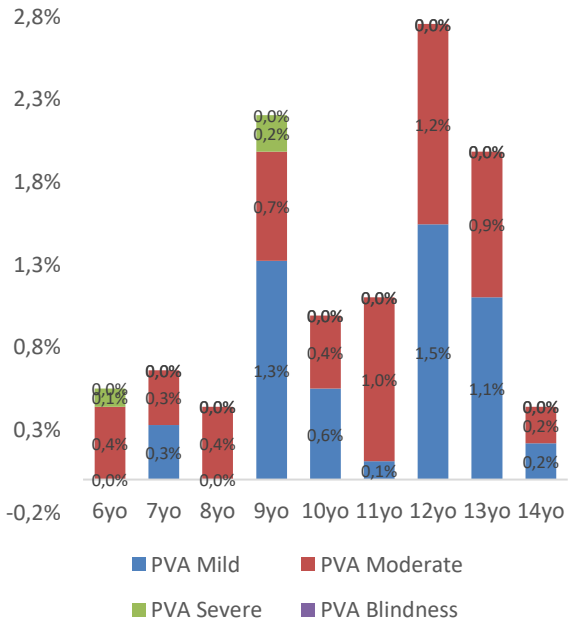


UCVA : *Uncorrected Visual Acuity*

Figure 1. UCVA Classification Based on Age Distribution

When comparing visual impairment with UCVA based on total age distribution, as shown in Figure 1, the highest prevalence was observed in 12 years age group, with the most significant classification was moderate visual impairment (2.3%).



PVA : *Presenting Visual Acuity*

Figure 2. PVA Classification Based on Age Distribution

Meanwhile, the highest prevalence of visual impairment with PVA (Figure 2) was also found among 12 years old children, with the most significant classification was mild visual impairment (1.5%).

In Table 3, female students were more likely to have visual impairment. Among 147 students with visual impairment from UCVA, 84 (9.3%) were female, while 63 (6.9%) were male. Similarly, among 101 students with visual impairment from PVA, 59 (6.5%) were female, and 42 (4.6%) were male.

Table 3. Visual Impairment Based on Gender Distribution

Gender	Male	Female	Total
UCVA			
Normal	397	363	760 (83.8)
Mild	26	23	49 (5.4)
Moderate	30	56	86 (9.5)
Severe	4	4	8 (0.9)
Blindness	3	1	4 (0.4)
Total UCVA	**63 (6.9)**	**84 (9.3)**	
PVA			
Normal	418	388	806 (88.9)
Mild	19	28	47 (5.2)
Moderate	21	30	51 (5.6)
Severe	2	1	3 (0.3)
Blindness	0	0	0 (0)
Total PVA	**42 (4.6)**	**59 (6.5)**	

*n=907; UCVA : *Uncorrected Visual Acuity*; PVA : *Presenting Visual Acuity*

DISCUSSION

Uncorrected visual impairment in children can significantly affect their learning process and psychosocial development. Children with visual impairment may struggle with academic performance, social interactions, and overall cognitive development due to difficulty in reading, writing, and recognizing visual cues in their environment. Early detection and intervention for visual impairment are crucial in decreasing the risk of blindness in the future

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and ensuring better quality of life for affected children.[1]

Globally, the prevalence of visual impairment in children with uncorrected visual acuity (UCVA) is reported to be 12.72%.[14] However, the prevalence of visual impairment among children aged 6-14 years in this study was found to be 16.2%, which is notably higher than global prevalence. Several studies conducted in Asia, particularly in Vietnam, Malaysia, and Southern China, had also reported higher prevalence rates compare to the global average. The reported prevalences in these regions were 19.4%, 17.1%, and 23% respectively.[1,15,16] These findings suggest that visual impairment in children is significant concern in various Asian countries, with prevalence rate surpassing the global average. Conversely, studies conducted in other region, such as Kutime Health Center Papua, Southwest China, and India, had reported lower prevalence rates than the global number. The prevalence rates in these regions were 5.71%, 12.2, and 3.8% respectively.[17–19] These variations indicate that factors such as genetics, environmental conditions, healthcare accessibility, and socioeconomic status may play role in the differences observed across various regions. The prevalence of visual impairment with presenting visual acuity (PVA) in this study was found to be 11.1%. This number is higher than the prevalence reported in Malaysia, India, and Southern Ethiopia, which the rates were 10.1%, 4.9%, and 5.2%, respectively. However, the prevalence reported in Vietnam and Southern China were slightly higher than in this study, with 12.2% and 23.0%, respectively.[1,15,16]

This study shows that the most common type of visual impairment among children, based on both UCVA and PVA assessment, was moderate visual impairment. The prevalence of moderate visual impairment in this study was 9.5% with UCVA and 5.6% with PVA. This aligns with studies conducted in Southern China and India, which reported similar results of 7.0% and 56.15%, respectively.[16,18–20] However, some studies have reported trends regarding the severity of visual impairment. Research conducted in LCES (The Lhasa Childhood Eye Study) in China, as well as the studies in Southern Ethiopia and Bhutan, found that mild visual impairment was more common in their study populations.[14,18,19]

When analyzing the prevalence of visual impairment based on age distribution, this study found that the highest number of visual impairments with UCVA was observed in children aged 12 years old. Similar results were reported in studies conducted in Southern China and East India, which the highest prevalence of visual impairment was observed in children in aged 12–15 years and 11–15 years, respectively.[16,19] Whereas, the highest prevalence of visual impairment with PVA in this study was also observed most significant in 12 years. This finding has similar results with study conducted in India, which children aged 11–15 years had the highest prevalence of visual impairment in PVA. The variations in age-related prevalence suggest that visual impairment may develop or become more noticeable at different ages depending on various factors, such as access to early eye screening.[20]

The global prevalence of visual impairment has shown a reduction from UCVA to PVA by 5.38%.[14] Studies in Vietnam and Malaysia have reported even greater reduction in prevalence, with decreases of 7.2% and 7.0%, respectively.[1,15,16] The findings of this study revealed a similar reduction number to the global trend, with a decrease of 5.1% from UCVA to PVA. The highest decreasing rates sequentially from blindness, severe, moderate, and mild visual impairment. This pattern suggests that that the more severe the visual impairment**,** the greater correction will be conducted.

In the term of gender distribution, the study found that female children were more likely to experience visual impairment than male children. Among the children with visual impairment, 57.14% were female, while 42.86% were male. This result align with finding from a study conducted at Cicendo National Eye Hospital in 2015, which reported

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that the majority of outpatient visits in the Pediatric Ophthalmology and Strabismus Department were from female children patients.[9] Similarly, a study conducted at Kutime Health Center Papua found that female children (6.81%) experienced more visual impairment than male children (4.91%).[17] On the other hand, studies in China and Northwest Ethiopia found that male children were more likely to have visual impairment and declared that there was not enough relationship between visual impairment and gender.[18,21]

One of the limitations of this study is that data collection was conducted only from six schools, with an uneven distribution of data across different age groups. More schools and a more balanced age distribution are necessary to get more representative data. Further study and examination of Best Corrected Visual Acuity (BCVA) are needed to obtain the causes and the risk factors of visual impairment.

CONCLUSION

In conclusion, the prevalence of visual impairment in children age 6-14 years from six schools in subdistrict Lengkong, Bandung is 16.2% with UCVA and 11.1% with PVA. The uttermost attempt for decreasing visual impairment in schoolchildren is shown by decreasing the number of visual impairments from UCVA to PVA by about 5.1%, which is similar to the global number. These results need to be concerned by schools and local government to make further policies regarding children's eye health since visual impairment can disturb the learning process and psychosocial development later on.

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DECLARATIONS

Author contribution. R.R.A.W.R. contribute to the conceptualization, data curation, and manuscript writing. D.R. contribute to the methodology, analysis, and editing of the manuscript. P.O.A. contributed to project supervision and critical review of the manuscript. All the authors have read and approved the final version of the manuscript.

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